

REMARKS

I. Status of the Application

Claims 12-20 are pending in this application. In the August 25, 2006 office action, the examiner:

A) rejected claims 12-20 as having informalities;

B) rejected claims 12, 14-17 and 19-20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,239,491 to Pasch et al. (hereinafter "Pasch") in view of U.S. Patent No. 6,087,724 to Shields et al (hereinafter "Shields").

C) rejected claims 13 and 18 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Pasch in view of Shields in further view of U.S. Patent Publication No. US 2001/0046784 to Broekaart et al.

In this response, applicants have amended claim 12 to further clarify the inventive subject matter. Applicants have also added new claims 21-29. Applicants respectfully request reconsideration of pending claims 12-20 in view of the foregoing amendments and the following remarks.

II. The Claim Objections are Moot

The Examiner objected to claims 12-20 because of an informality in claim 12. The Examiner identified the informality as an inadvertent deletion of the terms "a first terminal" from claim 12. (August 25, 2006 office action at p.2). Applicants have amended claim 12 to reinstate the language "a first terminal" as previously presented. It is therefore respectfully submitted that the objections to the claims are moot and may be

withdrawn.

III. The Obviousness Rejection of Claim 12

Claim 12 stands rejected as alleged being obvious in view of Pasch and Shields. Claim 12 has been amended to recite that the third conductive material comprises an *integrally-formed* third conductive material. The proposed combination of Pasch and Shields does not teach a device as claimed that includes an integrally-formed third conductive material.

A. The Amendment to Claim 12

As discussed above, claim 12 as been amended to recite that the third conductive material is integrally formed. Support for this amendment may be found in Figs. 2G and 2H of the application as filed, as well as the accompanying text at page 12, line 24 to page 13, line 38. Please note that in the specification, the first conductive material 233 is an embodiment of the *claimed* second conductive material, and the second conductive material 235 is an embodiment of a the *claimed* third conductive material, with the conductive material 219 being an embodiment of the *claimed* first conductive material. As plainly disclosed in Fig. 2H as well as in page 13, lines 29-31, the material 235 of the terminal 239 is uniformly created in a single pass, resulting in an *integrally-formed* structure.

As an integrally formed structure, the claimed conductive material has several structurally related advantages. An integrally-formed contact structure helps ensure the integrity of the electrical contact and limits the possibility of introduction of

defects into surrounding material. An integrally-formed conductive structure has a reduced contact resistance when compared to multiple contact plugs arranged on top of each other.

B. The Proposed Combination Does Not
 Disclose an Integrally Formed Contact as Claimed

In the rejection of claim 12, the Examiner asserts that Pasch teaches all of the elements of the invention with the exception of the first recess extending into the first insulating layer and filled with a second conductive material such that the second conductive material contacts a top and side surface of the first insulating layer. (August 25, 2006 office action at pp.3-4). With regard to the third conductive material, the Examiner contends that the material filling the opening 134 and via 154 of Pasch satisfies this limitation. (*Id.* at p.3).

However, it is submitted that material in the opening 134 and via 154 of Pasch is *not* integrally formed. As a consequence, the material in the opening 134 and the via 154 cannot constitute an integrally-formed third conductive material that extends to the second terminal surface through the first and second insulating layers, as recited in claim 12.

In particular, as plainly disclosed in Pasch at col. 7, lines 42-67, the opening 134 and the via 154 are filled at completely different times. In particular, the opening 134 is filled with conductive material before the dielectric layer 150 exists. After the opening 134 is filled, the second dielectric layer 150 is added. The via 154 is thereafter created and filled. Accordingly, the material in the via 154 and the material in the opening are *not* integrally formed.

Because the material (i.e. “plugs”) in the via 154 and opening 134 are separately formed, the device of Pasch suffers from drawbacks not associated with an integrally formed conductive structure. First, the interface between the plugs introduces resistance. Second, the separate formation of the plugs can result in misalignment of the plugs with respect to each other. The claimed integrally-formed third conductive material avoids these drawbacks of separate formed plugs.

Accordingly, Pasch fails to disclose an integrally-formed third conductive material as claimed in claim 12. Moreover, even if Pasch were modified to include the claimed first recess as proposed by the Examiner, the resulting device would not include an integrally-formed third conductive material as claimed.

For all of these reasons, it is respectfully submitted that the obviousness rejection of claim 12 should be withdrawn.

IV. Rejection of Claims 14-17, 19 and 20 Under
35 U.S.C. § 103(a) Should be Withdrawn

Claims 14-17, 19 and 20 also stand rejected as allegedly being unpatentable over Pasch and Shields. Claims 14-17, 19 and 20 all depend from and incorporate the limitations of claim 12. Accordingly, for at least the same reasons as those set forth above in connection with claim 12, it is respectfully submitted that the obviousness rejection of claims 14-17, 19 and 20 should be withdrawn.

V. Rejection of Claims 13 and 18 Under
35 U.S.C. § 103(a) Should be Withdrawn

Claims 13 and 18 both stand rejected as allegedly being unpatentable over Pasch, Shields and Broekaart. Claims 13 and 18 both depend from and incorporate the

limitations of claim 12. As discussed above, the combination of Pasch and Shields does not arrive at the invention of claim 12. Moreover, none of the modifications proposed by the Examiner in the rejections of claims 13 and 18 cure the deficiency of Pasch and Shields with respect to claim 12. Accordingly, for at least the same reasons as those set forth above in connection with claim 12, it is respectfully submitted that the obviousness rejection of claims 13 and 18 should be withdrawn.

VI. New Claim 21

New claim 21 includes all of the limitations of claim 12 as it stood prior to this amendment. New claim 12 also includes a new limitation “wherein the third conductive material is formed in a single step of filling”. As discussed above in connection with claim 12, Pasch teaches a “third conductive material” that is formed in two filling steps. Moreover, these two filling steps are separated by steps of forming another insulating layer and forming another via.

Because the third conductive material is filled in a single step, the claimed conductive material has several structurally related advantages. Filling the conductive material in a single step helps ensure the integrity of the electrical contact and limits the possibility of introduction of defects into surrounding material.

For the foregoing reasons, claim 21 is allowable over Pasch and the prior art of record. Claims 22-29 all depend from claim 21 and are allowable for at least the same reasons.

VII. Conclusion

For all of the foregoing reasons, it is respectfully submitted the applicant has made a patentable contribution to the art. Favorable reconsideration and allowance of this application is therefore respectfully requested.

In the event applicant has inadvertently overlooked the need for an extension of time or payment of an additional fee, the applicant conditionally petitions therefore, and authorizes any fee deficiency to be charged to deposit account 13-0014.

Respectfully submitted,



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